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ELEVATOR DEVICE

[EREBETA SOUCHI]

MIZUNO YUKIOMI

UNITED STATES PATENT AND TRADEMARK OFFICE
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INVENTOR	(72):	MIZUNO YUKIOMI
APPLICANT	(71):	MITSUBISHI ELECTRIC CORP
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1. NAME OF INVENTION

Elevator Device

2. CLAIMS

An elevator device having two or more elevator shafts, partitioned off by middle beams, and having guide rails for elevator cages, etc. attached to the middle beams, where a part of or full length of the said middle beams are bent at a right angle at the center section and then bent again at a right angle in the opposite direction to form a crank shape, and where guide rails are attached close to the bent section on the said elevator shaft side.

3. DETAILED DESCRIPTION OF THE INVENTION

[Field of industrial application]

This invention relates to an elevator device with two or more elevator shafts set side-by-side, and specifically it relates to an improvement of the middle beams located between the neighboring elevator shafts.

[Conventional technology]

Figure 5 shows a horizontal cross-section view of the elevator shafts of conventional elevator device. In this figure, (1) and (1a) are side-by-side elevator shafts surrounded by the wall (2); (3) is a middle beam made from H-beam, for example, separating elevator shafts (1) and (1a); and these middle beams are placed in appropriate intervals for the full height of the elevator shafts (1) and (1a). The (4) and (4a) are elevator

* Numbers in the margin indicate pagination in the foreign text.

cages set in the elevator shafts (1) and (1a); while (5) and (5a) are counterweights which are connected to the elevator cages (4) and (4a) by respective ropes (not shown). Further, (6), (6a) and (6b), (6c) are cage-side guide rails attached to the walls (2) surrounding the elevator shafts (1) and (1a) and the middle beams (3); while (7), (7a) and (7b), (7c) are weight-side guide rails attached to the walls (2) surrounding the elevator shafts (1) and (1a) and the middle beams (3); and the elevator cages (4) and (4a) as well as counter weights (5) and (5a) travel along the cage side guide rails (6) - (6c) and the weight-side guide rails (7) - (7c) within the elevator shafts (1) and (1a). This figure shows a case where the weight-side guide rails (7) - (7c) are attached to the middle beams (3).

Of these cage-side guide rails (6) - (6c) and weight-side guide rails (7) - (7c), those guide rails (6), (6a), (7) and (7a) on one side /546 are attached, as shown in Figure 6(a) for example, by clips (10), etc., to the bracket (8) on the walls surrounding the elevator shafts (1) and (1a), protruding slightly into the elevator shafts (1) and (1a). And, the other guide rails (6b), (6c), (7b) and (7c) are attached, as shown in Figure 6(b) for example, by clips (10) etc. to the brackets (9) on the middle beams (3), protruding significantly into the elevator shafts (1) and (1a). In this case, the brackets (9) should protrude by only "h" distance from the middle beam (3) into the elevator shafts (1) and (1a) so that these brackets do not come in contact, and do not interfere, with the elevator cages (4) and (4a) or the middle beams (3) when the counterweights (5)

and (5a) travels up and down.

[Problems to be Solved by this Invention]

As was mentioned above, since the conventional guide rail brackets (9) attached to the middle beams (3) protruded significantly into the elevator shafts (1) and (1a) so that they do not interfere with movements of the counter weights (5) and (5a), the width of the elevator shaft W_1 became rather large and the elevator space took up too much space in the building. And this became even more pronounced as the number of elevators to the installed side-by-side increased.

This invention is an attempt to resolve this issue by providing an elevator device which reduces the width of the opening of elevators installed side-by-side and thus reduces the elevator space in the building.

[Means of Solving the Problems]

With this elevator device under this invention, having two or more side-by-side elevator shafts, a part of or the full length of the said middle beams separating the elevator shafts are bent at a right angle at the center section and then bent again at a right angle in the opposite direction to form a crank shape, and guide rails are attached close to the bent section.

[Operation]

Install the counterweights or hydraulic jacks in the void sections created by the bent sections of the middle beams, and guide the traveling

elevator cages, counterweights, or plungers by the guide rails attached to the wall and the middle beams.

[Examples of this Invention]

Figure 1 is a horizontal cross-section view of an example of this invention; while Figure 2 is magnified top view of its major sections. Here, for those parts which are either the same or equivalent to the conventional example shown in Figure 5, we used the same markings and have omitted explanations. In this figure, (30) is a middle beam made from an H-beam, for example. At the center of the beam is a bent section (31), bending at a right angle; on the either side of it are straight line sections (32) and (33) extending in opposite directions. This forms a crank shape which provides void sections (34) and (35) formed from the bent section (31) and the straight section (32) as well as from the bent section (31) and the straight section (33), respectively. (36) is a bracket attached to the bent section (31) and straight section (33) on the elevator shaft (1) side of the middle beam (30), while (37) is a bracket attached to the bent section (31) and straight section (32) on the elevator shaft (1a) side of the middle beam (30). Both of The guide rails (6b), (6c), (7b), (7c) are attached to these brackets by clicks (10), etc. And the counterweights (5) and (5a) are contained in the void sections (34) and (35) and are connected to the elevator cages (4) and (4a). These counterweights (5) and (5a) travel up and down within the void sections (34) and (35) along the weight-side guide rails (7) and (7b) as well as (7a) and (7c). The brackets attached to the wall (2) are the same as the

brackets (8) shown in Figure 6 (a).

The middle beam (30) construction of this invention as shown above has significantly reduced the width W_2 between the cage-side guide rails (6b) and (6c) compared to the width W_3 between the guide rails under conventional construction. This also enabled to narrow the elevator opening width W.

Further, under the conventional configuration, the machine room located above the elevator stacks (1) and (1a) used to have one machine platform for each elevator shaft (1) and (1a) for hoist platform and hoisting device. But, under this invention, the elevator opening width W can be narrowed down, which enables, as shown in Figure 3, using only one machine platform (12) above the elevator shafts (1) and (1a) to share the platform between the hoisting platform (13) and (13a) and the hoisting devices (14) and (14a) for respective elevator shafts (1) and (1a). This enables reduction of the machine room (11) space, as well as sharing of a single machine platform (12) between two elevator shafts (1) and (1a), resulting in reduced costs.

Figure 4(a) is a horizontal cross-section view of another /547
example of this example, while Figure 4(b) is a vertical cross-section view of the example. This other example shows an application of this invention on elevators of a hydraulic side-plunger type. Here, (15) and (15a) are hydraulic jacks placed within the void sections (34) and (35); (16) is a plunger driven by the hydraulic power; and (17) and (17a) are guides. The plunger (16) travels up and down within the void spaces (34)

and (35) along the rails (7) and (7b) as well as (7a) and (7c) via guides (17) and (17a) driven by the hydraulic jacks (15) and (15a). (18) shows four ropes along the side of the hydraulic jack (15) , while (19) shows two ropes along the side of the elevator cages. When the plunger (16) extends by 1 m, for example, the elevator cage (4) is supposed to go up by 2 m (operating in 2:4 ratio).

The elevator opening width can be narrowed down in this example also since the hydraulic jacks can be installed in the void sections (34) and (35) created by the crank-shape middle beam (30). In these examples, we discussed application of this invention to elevator devices with two elevator shafts. However, this invention can be utilized with more than two elevator shafts, too. Further, we have shown guide rails attached to the wall and middle beams with brackets and clips. This invention is not limited to those methods, however, and other methods are permissible, too.

[Effect of the Invention]

With this elevator device under this invention, having two or more side-by-side elevator shafts, the middle beams separating the elevator shafts are bent at a right angle at the center section and then bent again at a right angle in the opposite direction to form a crank shape, and guide rails are attached close to the bent section. Since the counter weights or hydraulic jacks can be installed in the voids created by these bent sections, the width between two cage-side guide rails can be shortened significantly, enabling shorted width of the elevator opening and reducing

the elevator space in the building.

Further, this narrowed down elevator opening allows sharing of one machine platform for hoisting platforms and hoisting devices between two elevator shafts, reducing not only the machine room space, but also the cost. These are additional benefits of this invention.

4. BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a horizontal cross-section view of an example of this invention; Figure 2 is a magnification of its major section; Figure 3 is a horizontal cross-section view of a machine room of an example; Figure 4(a) is a horizontal cross-section view of another example of this example; Figure 4(b) is its vertical cross-section view; Figure 5 is a horizontal cross-section view of an example of conventional elevator device; and Figure 6 (a) and (b) are magnified top view showing the guide rails mounting.

In these figures, (1) and (1a) are elevator shafts; (2) is the surrounding wall; (4) and (4a) are elevator cages; (5) and (5a) are counter weights; (6) - (6c) are cage-side guide rails; (7) - (7c) are weight-side guide rails; (8), (36), and (37) are brackets; (11) is a machine room; (15) and (15a) are jacks; (16) is a plunger; (30) is a middle beam; (31) is a horizontal section; (32) and (33) are vertical sections; and (34) and (35) are void sections.

In these figures, the same markings denote the same or equivalent parts.

Figure 5

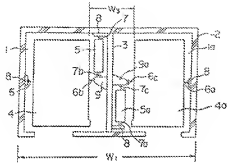

Figure 6

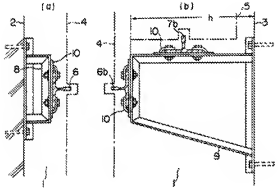

Figure 1

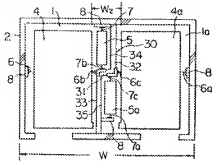

Figure 2

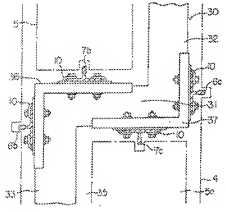

Figure 3

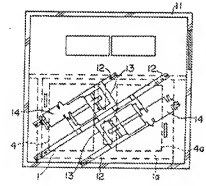

Figure 4